IDUG 30 Years 1988 2018

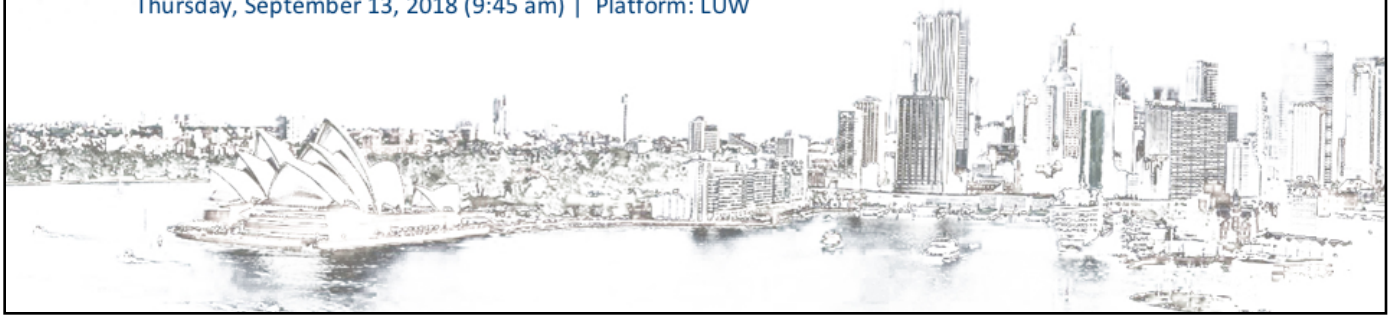
IDUG Db2 Australasian Tech Conference
Sydney, Australia I September 11-13, 2018

#IDUGDb2

10 Minute Triage: Troubleshooting Production Issues 101

Michael Krafick (Twitter: @mkrafick)
Lead Db2 Database Engineer, Atlanta

Session Code: H6
Thursday, September 13, 2018 (9:45 am) | Platform: LUW



Session Objectives

- Why is speed of recovery important? (Cost of database downtime)
- "What is Normal?"
- Inefficiency vs. Pain. How does one lead to another?
- Common bottlenecks and unexpected ripple affects.
- Developing an assessment plan and a triage toolbox.

2

The Cost of Downtime

Hey Mike, can you remember $237.00 a minute?

Wrap Your Head Around the Scope

Downtime	Cost in Penalties	Could Buy
15 Minutes	$3,555.00	1-2 Macbook Pros
30 Minutes	$7,110.00	1 Mo "Avg" I/T Salary
45 Minutes	$10,665.00	1-2 High End Big Screen TVs
60 Minutes	$14,220.00	Used Car
4 Hours	$56,880.00	1-2 at a University
8 Hours	$113,760.00	Tesla Roadster
12 Hours	$170,640.00	143,396 Tacos at Taco Bell
16 Hours	$227,520.00	Cabin in the Mountains
24 Hours	$341,280.00	More than my house

What is Normal?

Not the client currently running around with their hair on fire.

or

It's not my circus, not my monkey.

You Can't Manage What You Don't Measure

Information is important for capacity planning and trending, but it is critical in a disaster.

What is Normal?

Is a .5 second query execution in a online banking application normal?

How about a 25 minute pipeline report execution in a Data Warehouse?

Holy cow, we have 750 connected users at 10am!

Should my data disk be spinning at 4000 IOPS?

Defining "Normal"

Collect metrics that serve a purpose. Spearfish data and avoid the fishing net.

- Metric collection has an impact. What footprint will you leave?
- Characteristics of good data collection:

1. Easy to collect
2. Easy to understand
3. Relevant
4. Sensitive, without false alarm. A variance in metric that signals change

7

Characteristics of good data collection used with permission - "Tuning and Monitoring Database System Performance" by Steve Reese (pg.18)

Be a SEAL Team, not a Storm Trooper

Sniping the Metrics

- Application Level - Key Performance Indicators (KPI)

  Abandoned Shopping Carts | Website Traffic | Order Fulfillment

- Database Level

Performance	(How have we been? How are we doing?)
Pain	(Early warning system.)
Configuration	(How should we be running?)

- Operating System / Server Level

  CPU Saturation | IO Per Second (Disk) | Swap Space (Memory)

Efficiency vs. Pain

Man, I didn't see that coming.

10

Why do I differentiate between the two?

Because one shows we are broken, another shows how we got to the broken state.

So monitor on all, but alert on few.

Efficiency Metrics Show Stress

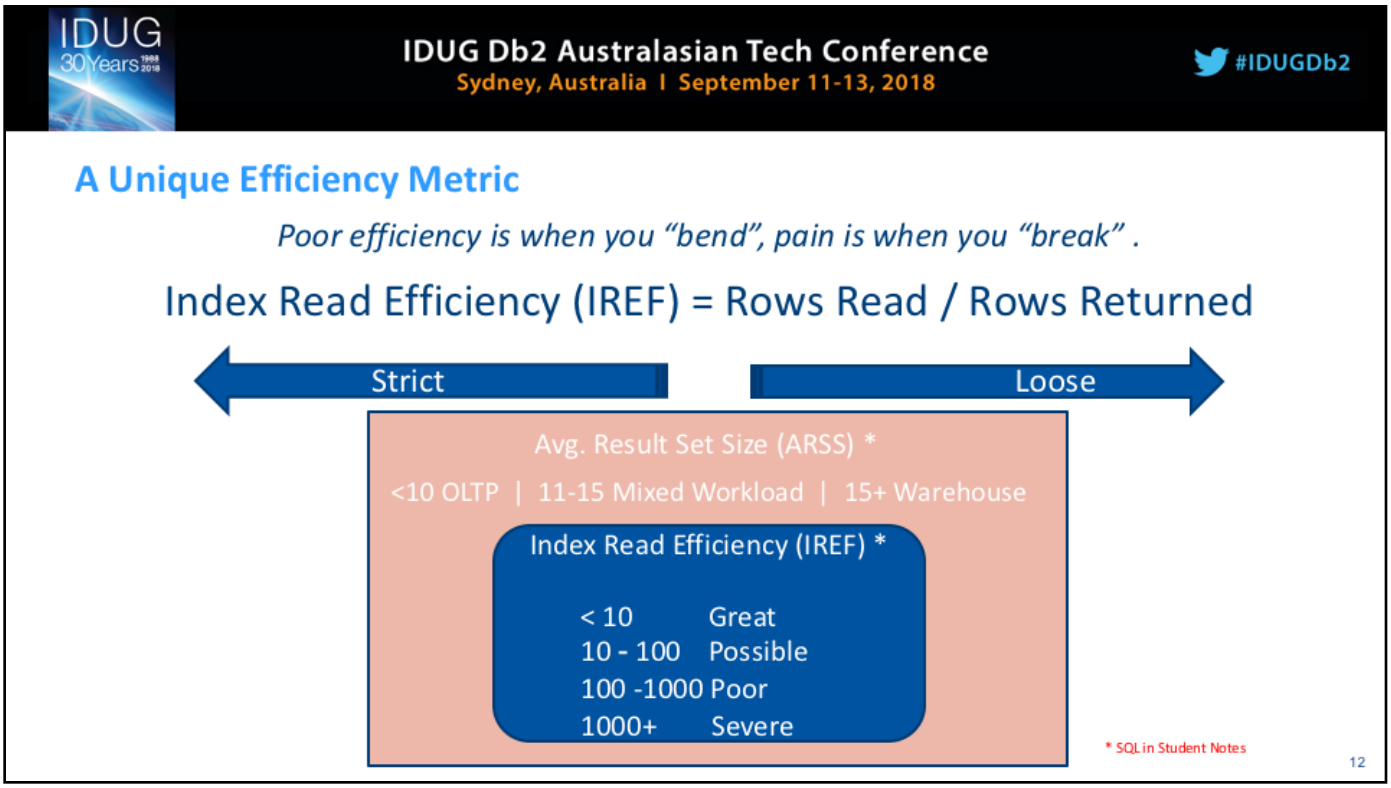
Typically shows a slow build of problems or capacity issues coming.

Efficiency:

Index Read Efficiency	Top 10 SQL – Number Executions
Avg. Result Set Size	Top 10 SQL – Execution Time
Lock Escalation / Lock Waits / Deadlocks	CPU Utilization
Bufferpool Hit Ratio	I/O Wait Time
Database Inside vs. Outside Time	

11

These are metrics I traditionally try to record for a historical period of time. Allows for capacity planning, shows behavior changes after a release, and allows you to go back and troubleshoot after a problem starts.

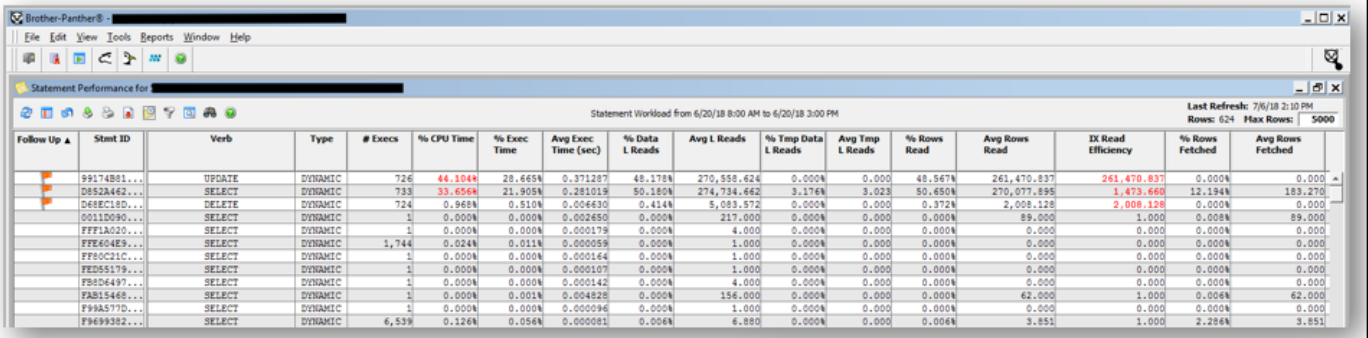


ARSS (at a database level): ROWS_RETURNED/SELECT_SQL_STMTS

Script to Determine ARSS and IREF at the DISCOVER.DB2 repository of my GitHub Account:

DiscoverDB2/IREF.sql - https://github.com/MKrafick/DiscoverDB2/blob/master/IREF.sql

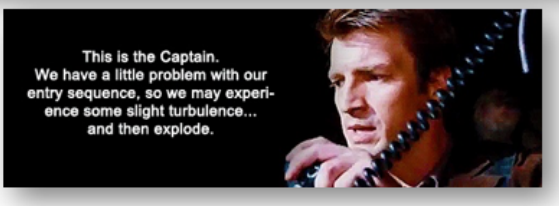
Flushing Out Inefficiency with Brother-Panther



Follow Up ▲	Stmt ID	Verb	Type	# Execs	% CPU Time	% Exec Time	Avg Exec Time (sec)	% Data L Reads	Avg L Reads	% Tmp Data L Reads	Avg Tmp L Reads	% Rows Read	Avg Rows Read	IX Read Efficiency	% Rows Fetched	Avg Rows Fetched
	99174B81...	UPDATE	DYNAMIC	726	44.104%	28.665%	0.371287	48.178%	270,558.624	0.000%	0.000	48.567%	261,470.837	261,470.837	0.000%	0.000
	D852A462...	SELECT	DYNAMIC	733	33.656%	21.905%	0.281019	50.180%	274,734.662	3.176%	3.023	50.650%	270,077.895	1,473.660	12.194%	183.270
	D68EC18D...	DELETE	DYNAMIC	724	0.968%	0.510%	0.006630	0.414%	5,083.572	0.000%	0.000	0.372%	2,008.128	2,008.128	0.000%	0.000
	0011D090...	SELECT	DYNAMIC	1	0.000%	0.000%	0.002650	0.000%	217.000	0.000%	0.000	0.000%	89.000	1.000	0.008%	89.000
	FFF1A020...	SELECT	DYNAMIC	1	0.000%	0.000%	0.000179	0.000%	4.000	0.000%	0.000	0.000%	0.000	0.000	0.000%	0.000
	FFE604E9...	SELECT	DYNAMIC	1,744	0.024%	0.011%	0.000059	0.000%	1.000	0.000%	0.000	0.000%	0.000	0.000	0.000%	0.000
	FF80C21C...	SELECT	DYNAMIC	1	0.000%	0.000%	0.000164	0.000%	1.000	0.000%	0.000	0.000%	0.000	0.000	0.000%	0.000
	FED55179...	SELECT	DYNAMIC	1	0.000%	0.000%	0.000107	0.000%	1.000	0.000%	0.000	0.000%	0.000	0.000	0.000%	0.000
	FBED6497...	SELECT	DYNAMIC	1	0.000%	0.000%	0.000142	0.000%	4.000	0.000%	0.000	0.000%	0.000	0.000	0.000%	0.000
	FAB15468...	SELECT	DYNAMIC	1	0.000%	0.001%	0.004825	0.000%	156.000	0.000%	0.000	0.000%	62.000	1.000	0.006%	62.000
	F99A577D...	SELECT	DYNAMIC	1	0.000%	0.000%	0.000096	0.000%	1.000	0.000%	0.000	0.000%	0.000	0.000	0.000%	0.000
	F9699382...	SELECT	DYNAMIC	6,539	0.126%	0.056%	0.000081	0.006%	6.880	0.000%	0.000	0.006%	3.851	1.000	2.286%	3.851

Index Read Efficiency (IREF)

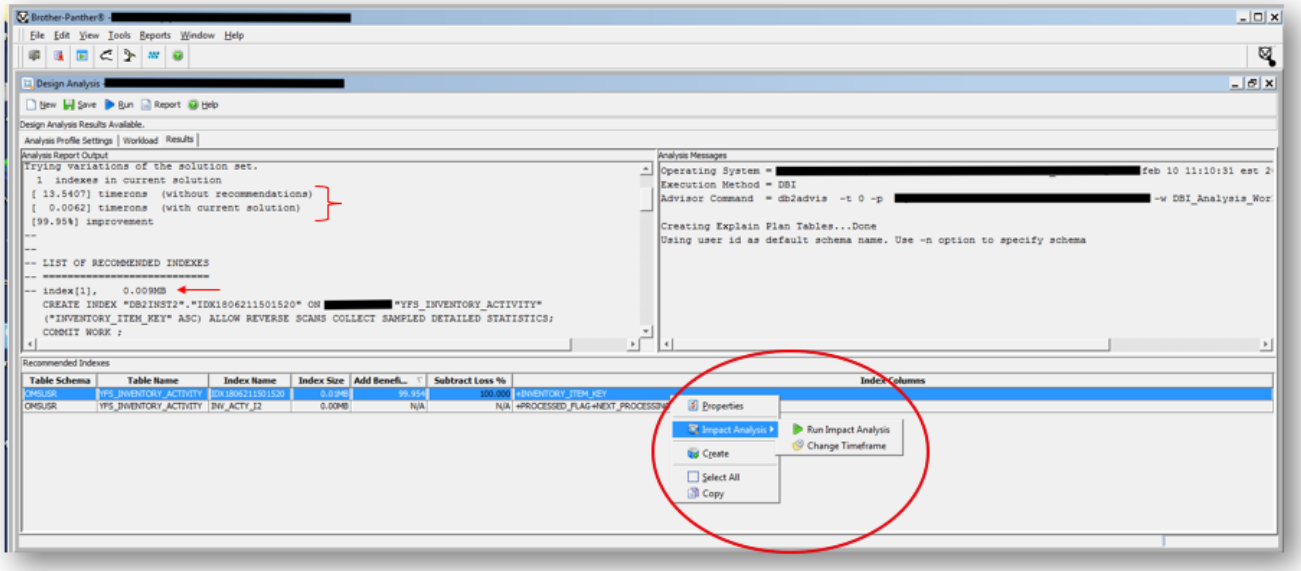
< 10	Great
10 - 100	Possible
100 -1000	Poor
1000+	Severe



13

Notice that in this 7 hour period, one sub-second SQL executed so much that it consumed 44% of the CPU during that time period.

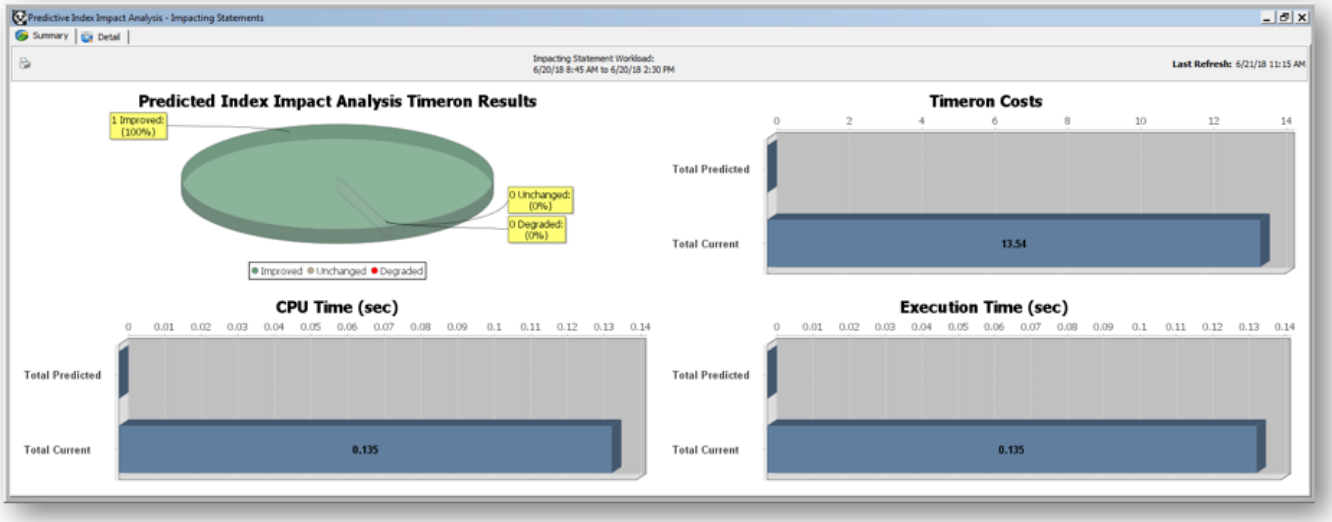
Flushing Out Inefficiency with Brother-Panther



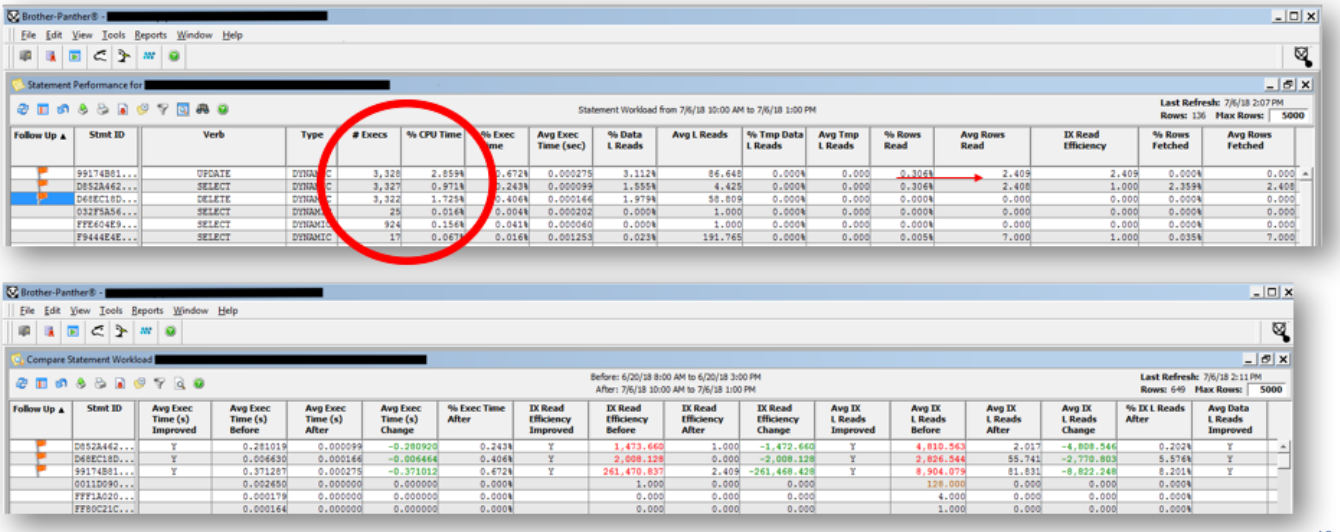
14

Normally a cost of 13 Timerons wouldn't make a DBA even blink with concern, but the IREF shows it as a red flag and Brother-Panther can show how it consumes CPU.

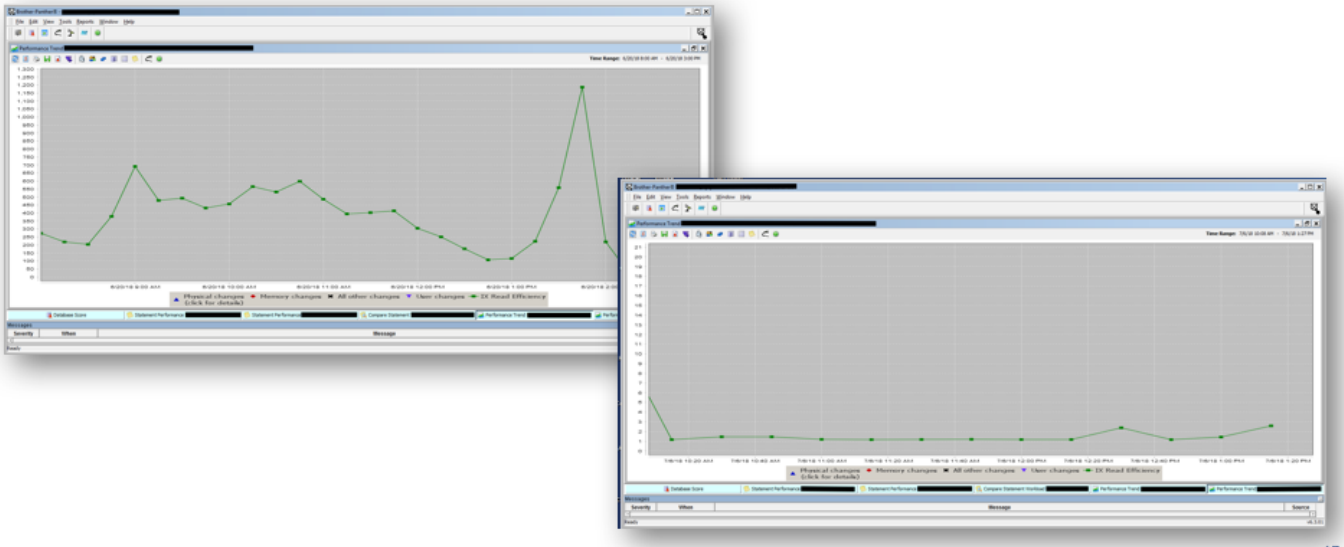
Flushing Out Inefficiency with Brother-Panther



Flushing Out Inefficiency with Brother-Panther



Flushing Out Inefficiency with Brother-Panther



www.youtube.com/DiscoverDB2

DISCOVER.DB2
Published on Jun 19, 2018

There are tons of metrics to show pain, but there are just as many to show efficiency. Index Read Efficiency (IREF) is a way to find SQL performance hogs that you may not normally catch. In today's episode, we will talk about the metric and how to interpret it.

Timestamps:
01:03 - What is Index Read Efficiency (IR
02:12 - IREF Threasholds
03:13 - IREF in context with Workload Type (ARSS)
05:32 - Analyzing Example Output
08:30 - SQL for find ARSS and IREF
10:13 - Github Repository with SQL

Useful Links:
(Blog) Boost Your Performance - https://tinyurl.com/ydyoaats
(DBI/Blog) Advice: IREF - https://tinyurl.com/ybwadpuq
(DBI/Blog) Performance: ARSS - https://tinyurl.com/ycxa4cfu
(Xtivia/Blog) IREF, a KPI - https://tinyurl.com/yczv2qag
(Blog) What is a Table Scan - https://tinyurl.com/ya2w9q5v
DBI's Brother Panther - https://tinyurl.com/yb22k763
Xtivia - http://www.xtivia.com/

YouTube Channel: https://www.youtube.com/DiscoverDB2

Pain Metrics Act as an Early Warning System

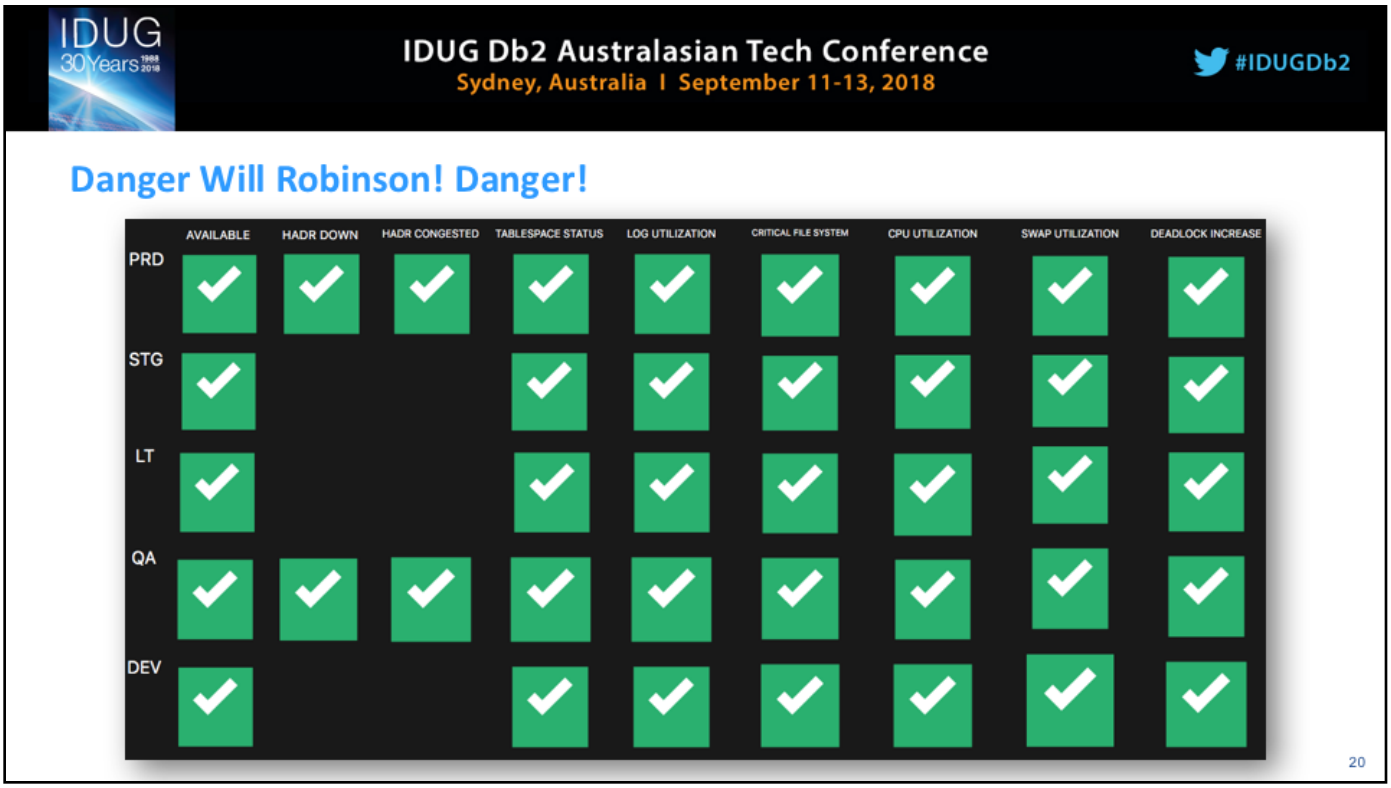
Early warning indicators, actively triage for a problem.

Pain:

Database Up/Down	HADR Congestion / Role Change
Lock Escalation / Lock Waits / Deadlocks	CPU Utilization
Number *Active* Connections	Disk Utilization
Active/Archive Log Utilization	Swap Space Utilization
Tablespace State	
Database Inside vs. Outside Time	

19

If there is a significant percentage jump, especially if it is sustainable, Investigate root cause. It's these metrics that cause me to go back and compare to (or look for a pattern in) historically captured performance data.



A dashboard can be tied into a tool backend like DBI's Brother Panther, to data collection from homegrown scripts, or from the Dashboard tool itself. However, be careful of footprint on the database. Repetitive SQL in an inefficient manner against old and deprecated tables can be dangerous.

Historical Efficiency/Performance Metrics

"DB2 Workload Manager as a Monitoring Solution" by Abhik Roy

This is part one of a three part series. The full series includes:
DB2 Workload Manager (WLM) as a Monitoring Solution – Understanding WLM (Part1 of 3)
DB2 Workload Manager (WLM) as a Monitoring Solution– How to Set up WLM (Part 2 of 3)
DB2 Workload Manager (WLM) as a Monitoring Solution– Analyzing WLM Information (Part 3 of 3)

Normally:

- A feature with Advanced Enterprise Server and Advanced Workgroup Server Editions.
- Normally priorities execution and use of resources.

Alternatively:

- Historically capture performance data such as ..
  I/O, Memory, Bufferpools, SortHeap, etc

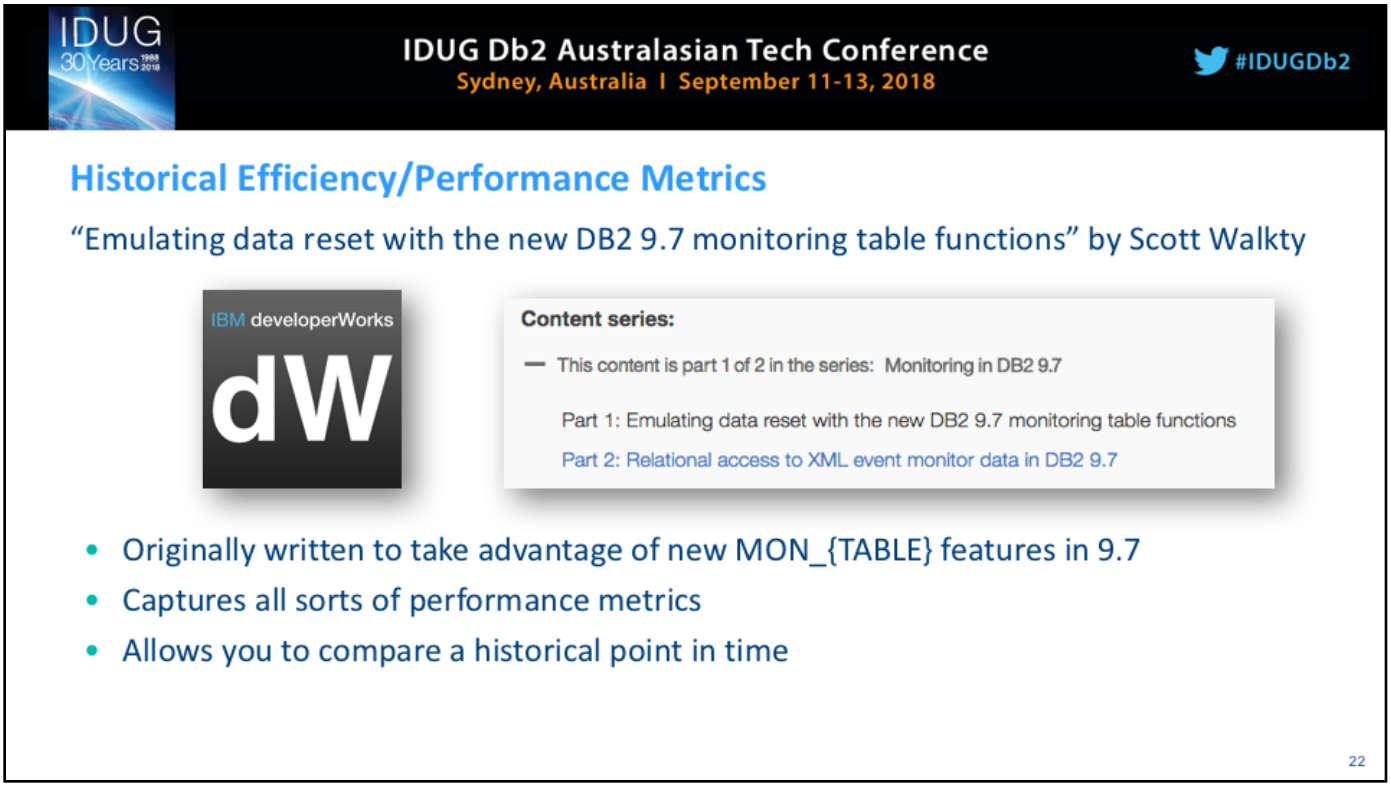
21

"DB2 Workload Manager as a Monitoring Solution" by Abhik Roy:

https://datageek.blog/2015/02/10/db2-workload-manager-wlm-as-a-monitoring-solution-understanding-wlm-part1-of-3/

https://datageek.blog/2015/03/17/db2-workload-manager-wlm-as-a-monitoring-solution-how-to-set-up-wlm-part-2-of-3/

https://datageek.blog/2015/04/07/db2-workload-manager-wlm-as-a-monitoring-solution-analyzing-wlm-information-part-3-of-3/



"Emulating data reset with the new DB2 9.7 monitoring table functions" by Scott Walkty:

http://www.ibm.com/developerworks/data/library/techarticle/dm-1009db2monitoring1/

DBI pureSuite

- Small Footprint
- Index Read Efficiency
- Average Result Set Size
- Percentage of Resource Utilization
- 5 Clicks to Solution
- Index Impact Analysis

Bottlenecks

When resource utilization looks like I-85.

When One Problem is Masked by Another Problem

When symptom is not a root cause.

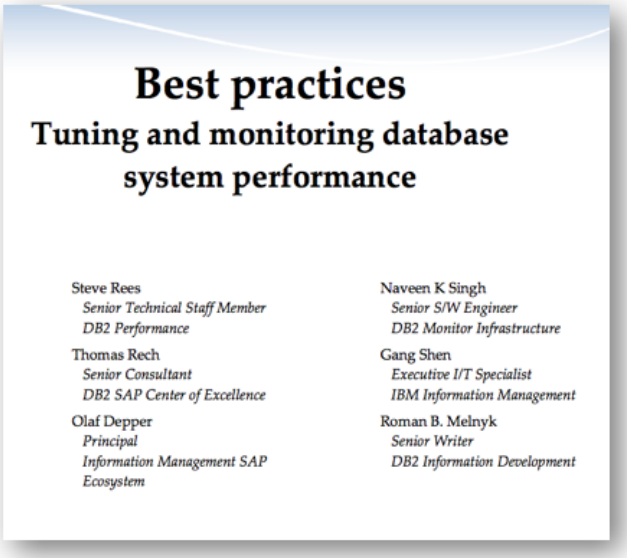
- Network latency shows up as a locking Issue
- Slow internal transaction time shows up as increase in number of connections
- Memory utilization shows up as CPU spike
- Disk contention shows up as a drop in Transactions Per Second

25

Alerting is reserved for the pain, where our historical data capture shows how we got there.

It helps you correlate the butterfly effect. We stepped on one butterfly (network latency) which caused a locking issue that would not otherwise be there.

Source Used with Permission



Best practices

Tuning and monitoring database system performance

Steve Rees
Senior Technical Staff Member
DB2 Performance

Thomas Rech
Senior Consultant
DB2 SAP Center of Excellence

Olaf Depper
Principal
Information Management SAP Ecosystem

Naveen K Singh
Senior S/W Engineer
DB2 Monitor Infrastructure

Gang Shen
Executive I/T Specialist
IBM Information Management

Roman B. Melnyk
Senior Writer
DB2 Information Development

The following slides on bottlenecks are heavily sourced, with permission, from best practices documentation written by Steve Rees.

26

Can be downloaded via developerWorks at this link: http://tinyurl.com/ldxlarw

Check Your Bottleneck and Choke Points

"You know, the usual suspects."

Four Types of Bottlenecks

Disk

- High I/O Wait Time (via iostat or vmstat).
- 30% I/O Wait Time could be a clue. If CPU is low as well, could be a strong lead.
- Disk Utilization is over 80%
- Lower to middle CPU Utilization (20-50%)
- High R/W times reported by DB2

28

Quick Evaluation of Server Level Metrics

Command: IOSTAT [INTERVAL] [COUNT]

```
db2inst1@                    'db2home/db2inst1 $ iostat 2 5
Linux 2.6.32-642.11.1.el6.x86_64 (                .mhsl01.mhsl.local)     03/18/2017      _x86_64_        (4 CPU)

avg-cpu:  %user   %nice %system %iowait  %steal   %idle
           2.11    0.12    0.74    0.51    0.02   96.50

Device:            tps   Blk_read/s   Blk_wrtn/s   Blk_read   Blk_wrtn
xvda              4.52         2.45        55.50   13951168  316510386
xvdb              0.00         0.02         0.07      93814     383816
dm-0              5.05        13.34        64.90   76079428  370148248
```

avg-cpu: **%IOWAIT** Percentage CPU was IDLE while waiting I/O to complete
%IDLE Percentage CPU was IDLE without an outstanding disk request

Device: **TPS** Transfers Per Second (an I/O request to the device)

Four Types of Bottlenecks

CPU

- Overall CPU Saturation
  - 95% is considered saturated
- Single CPU Saturation
  - Symptomatic a specific application or statement is root cause
- System Utilization : User Utilization ratio is unusual
  - [3 (System) : 1 (User)] or [4 (System) : 1 (User)] is not uncommon

Quick Evaluation of Server Level Metrics

Command: VMSTAT [INTERVAL] [COUNT]

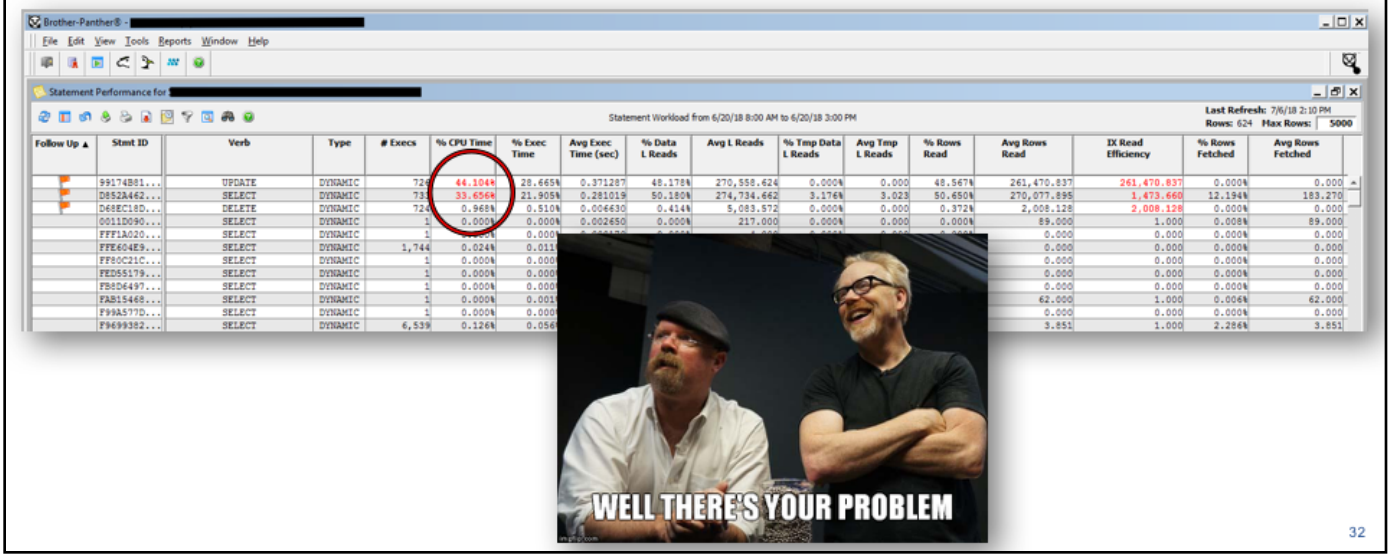
```
procs -----------memory---------- ---swap-- -----io---- --system-- -----cpu-----
 r  b   swpd   free   buff  cache   si   so    bi    bo   in   cs us sy id wa st
 0  0   7756 357620 382764 30648576    0    0    96    39    1    1  2  1 97  1  0
 0  0   7756 357604 382764 30648576    0    0     0    32  455  700  0  0 100  0  0
 0  0   7756 357604 382764 30648588    0    0     0     0  445  712  0  0 100  0  0
 0  0   7756 357108 382772 30648588    0    0     0     6  451  695  0  0 100  0  0
 0  0   7756 357232 382772 30648588    0    0     0    70  437  709  0  0 100  0  0
```

Procs:	**R** Processes waiting on Processor; **B** processes in sleep state
Memory:	**SWPD** How much memory (in K) swapped out or written to disk **FREE** Amount of free memory; **BUFF** Amount of memory in use
IO:	**BI** Bits in; **BO** Bits out
CPU:	**ID** CPU idle percentage; **WA** CPU wait percentage

31

This is a snapshot in time based on your wait interval.

CPU Saturation by Workload with Brother-Panther



Four Types of Bottlenecks

Memory

- Usually an alternate resource shows the pain because of extra work due to memory shortage
  - Small Log Buffer Size leading to (Log) Disk Bottleneck
  - Small Buffer Pool leading to Data/Index Tablespace Bottleneck
- Swap Space, usually with lower CPU, shows overall memory pressure

Quick Evaluation of Server Level Metrics

Command: top

```
top - 10:54:01 up 65 days, 22:03,  1 user,  load average: 0.00, 0.04, 0.00
Tasks: 295 total,   1 running, 292 sleeping,   0 stopped,   2 zombie
Cpu(s):  0.1%us,  0.2%sy,  0.0%ni, 99.7%id,  0.0%wa,  0.0%hi,  0.0%si,  0.0%st
Mem:  32749888k total, 32396996k used,   352892k free,   384232k buffers
Swap:  2096444k total,     7756k used,  2088688k free, 30650464k cached

  PID USER      PR  NI  VIRT  RES  SHR S %CPU %MEM    TIME+  COMMAND
 2106 root      20   0  412m  15m 1272 S  0.3  0.0  67:07.68 dthostagent
14071 db2inst2  20   0 6076m 1.8g 1.7g S  0.3  5.6 141:04.77 db2sysc
24345 root      20   0 17572 2256 1736 S  0.3  0.0   0:07.63 processes
24578 db2inst1  20   0 29736 1584 1084 R  0.3  0.0   0:00.14 top
    1 root      20   0 33680 1544 1164 S  0.0  0.0   0:42.81 init
    2 root      20   0     0    0    0 S  0.0  0.0   0:00.43 kthreadd
```

Does not show disk level metrics, but does show **top processes**

Easier to quickly interpret (in my opinion)

34

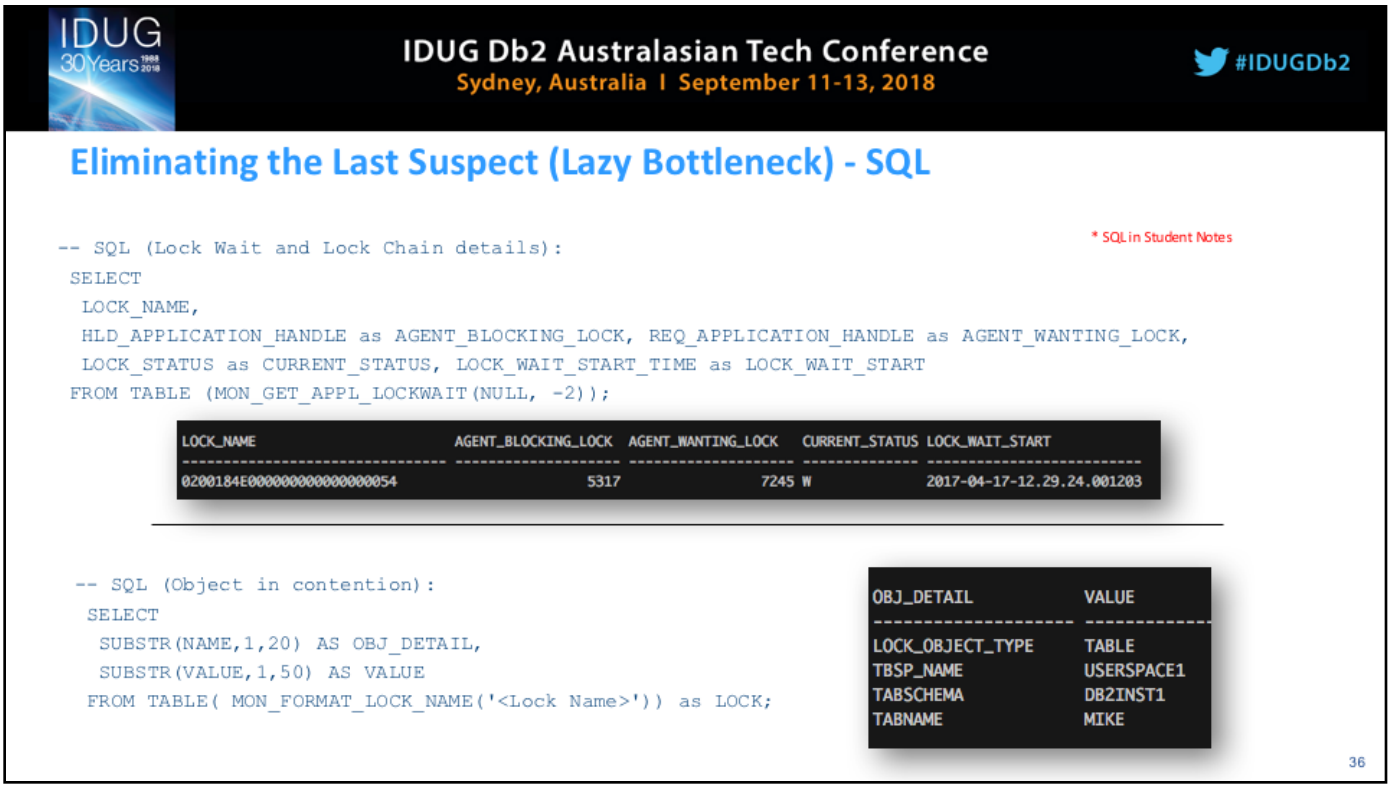
This is real time and continuously update.

Lazy Bottlenecks

"I'm givin' her all she's got Captain!"

When the system just can't be pushed any further, but the typical bottle neck isn't apparent.

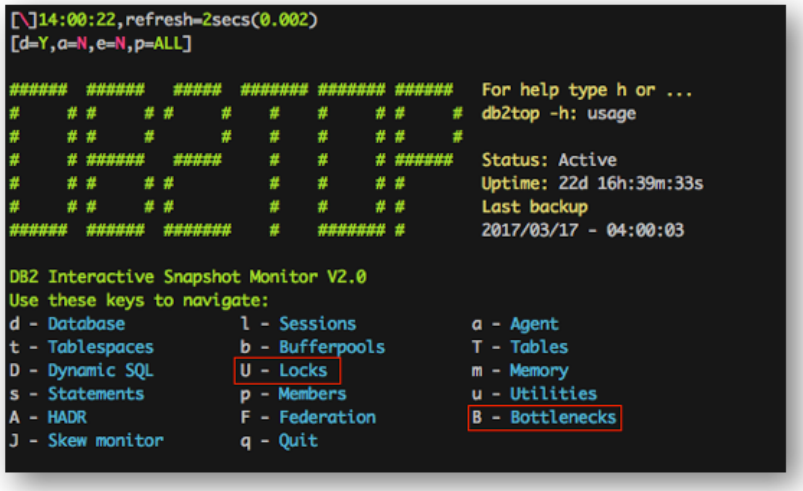
- Lock contention — Wait, Escalation, Timeout, Deadlock
- Prefetching isn't sufficient — "Data isn't waiting for me, let me go out and get it .."
- Poor page cleaning — "Let me stop and write this down before reading more data.."
- Application — Rate of requests decreases unexpectedly



Multiple LOCK Queries in Triage repository of my GitHub Account:
MKrafick/Triage - https://github.com/MKrafick/Triage

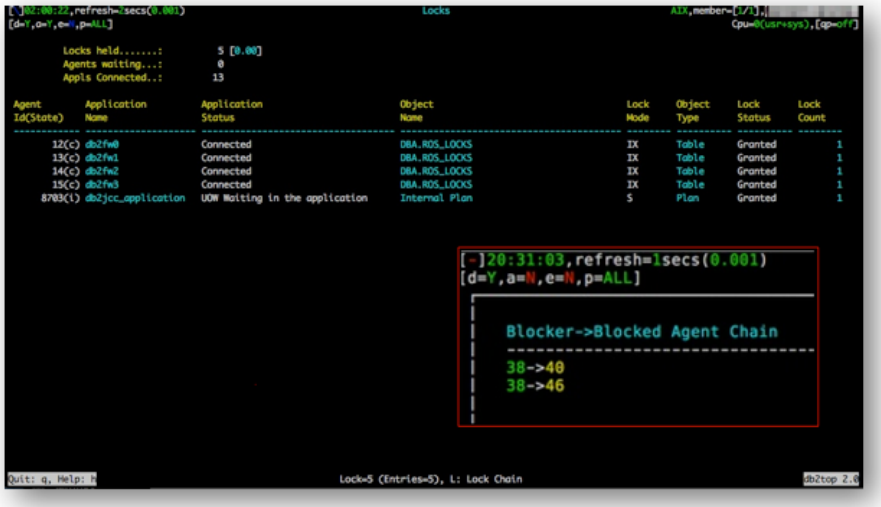
Lazy Bottleneck and the DB2 Point of View

Command: db2top -d DBNAME



Eliminating the Last Suspect (Lazy Bottleneck)

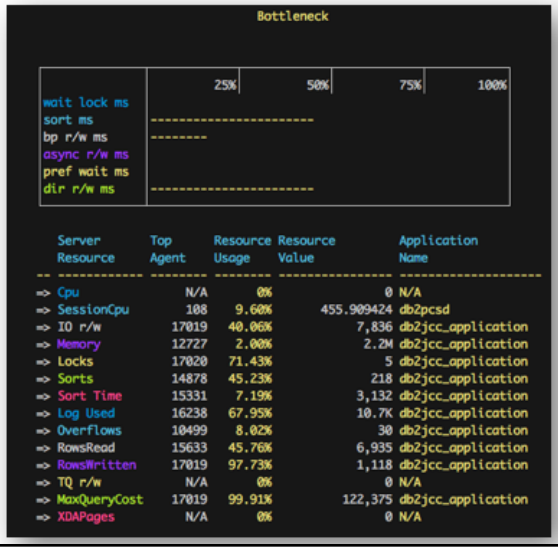
Command: db2top -d DBNAME (Then U: Locks / L: Lock Chain)



Screenshot used with permission –datageek.blog (Ember Crooks)

DB2 Bottleneck

Command: db2top -d DBNAME (Then B: Bottleneck)



Server Resource	Top Agent	Resource Usage	Resource Value	Application Name
=> Cpu	N/A	0%	0	N/A
=> SessionCpu	108	9.60%	455.909424	db2pcsd
=> IO r/w	17019	40.06%	7,836	db2jcc_application
=> Memory	12727	2.00%	2.2M	db2jcc_application
=> Locks	17020	71.43%	5	db2jcc_application
=> Sorts	14878	45.23%	218	db2jcc_application
=> Sort Time	15331	7.19%	3,132	db2jcc_application
=> Log Used	16238	67.95%	10.7K	db2jcc_application
=> Overflows	10499	8.02%	30	db2jcc_application
=> RowsRead	15633	45.76%	6,935	db2jcc_application
=> RowsWritten	17019	97.73%	1,118	db2jcc_application
=> TQ r/w	N/A	0%	0	N/A
=> MaxQueryCost	17019	99.91%	122,375	db2jcc_application
=> XDAPages	N/A	0%	0	N/A

Atypical Lazy Bottleneck (Mike's Observation)

Consider TABLESPACE STATE as a Lazy or Disk Bottleneck.

- Application (or Users) can suddenly do one task but not another
- Usually locks out access

BACKUP PENDING	After load, newly roll forward recovery
QUIESCED	Exclusively, prevents anyone from accessing
OFFLINE or NOT ACCESSIBLE	Disk level or container issue

Symptom:

Intermittent access for one query but not another, one user but not another, application receives SQL error code

Catching Tablespace State Issue

Query on a schedule, or a "as needed" script in triage tool box.

Build a dynamic script around three lines:

```
db2 -x "select substr(tbsp_name,1,20), substr(TBSP_STATE,1,20) from table
(MON_GET_TABLESPACE('',-2))" > $SCRIPTPATH/tbsp.tmp

TEST_TS=`cat $SCRIPTPATH/tbsp.tmp | grep -v
'NORMAL\|BACKUP_IN_PROGRESS\|LOAD_IN_PROGRESS\|REORG_IN_PROGRESS' | wc -l`

if [ $TEST_TS -gt 0 ]; then
   WHATEVER ALERTING OUTPUT YOU NEED
fi
```

* SQL in Student Notes

41

Tablespace State Hook available at the DBMonitoring repository of my GitHub Account:
DiscoverDB2/BAD_TABLESPACE_HOOK.sql - https://github.com/MKrafick/DBMonitoring/blob/master/BAD_TABLESPACE_HOOK.sql

Hexadecimal Values and various states can be found here – Knowledge Center: Tablespaces States

https://www.ibm.com/support/knowledgecenter/SSEPGG_10.5.0/com.ibm.db2.luw.admin.dbobj.doc/doc/c0060111.html

Triage The Problem

The database administrators crash cart.

First Tool – Question Everything

"Don't look for a needle in a needlestack."

Who picked up the problem?	*Alerting, end user, routine audit, etc*
What is the symptom?	*App. slow down, end user blank page, etc*
When did this happen?	*Timebox the problem*
Where did this happen?	*Database, server, environment*
Do you have details?	*Give me an application error message, etc*

Diag Parsing Script available at the DISCOVER.DB2 repository of my GitHub Account:

DiscoverDB2/PARSE_DIAG.ksh - https://github.com/MKrafick/DiscoverDB2/blob/master/PARSE_DIAG.ksh

Discover.DB2 Video (16:05) "Exploring the Db2 Error Log" - https://youtu.be/EOZrJUludRE

Note:

Db2diag.log is normally found `$INSTHOME/sqllib/db2dump`

`DIAGLEVEL:`

0 – No diagnostic data captured

1 – Severe errors only

2 – All errors

3 – All errors and warnings

4 – All errors, warnings and informational messages

Information in the DB2DIAG.log

```
2017-02-17-03.21.26.068716-360 I4761E590              LEVEL: Error
PID     : 11640                TID : 140265222301440 PROC : db2sysc 0
INSTANCE: db2inst1             NODE : 000            DB   : DBNAME
APPHDL  : 0-19101              APPID: 00.000.00.0.59488.170217092058
AUTHID  : OMSUSR               HOSTNAME: devbox.mhsl01.mhsl.local
EDUID   : 729                  EDUNAME: db2agent (DBNAME) 0
FUNCTION: DB2 UDB, buffer pool services, sqlbCheckStateTransition, probe:0
MESSAGE : ZRC=0x80020038=-2147352520=SQLB_INVALID_STATE_TRANSITION
          "Invalid state transition"
```

Level : Info, Warning, Error, Severe, Critical, Event

Proc(ess): Process name

APPID: Will match "List Applications", can show IP of incoming application with problem

AUTHID: ID running into the problem

Message: Verbose feedback on error.

Can contain a SQL Error Code, SQLSTATE, RC (Return Code), and ZRC Codes

Interpreting the DB2DIAG.log

MESSAGE: ZRC=0x80020038=-2147352520=SQLB_INVALID_STATE_TRANSITION
"Invalid state transition"

Command: db2diag –rc {ZRC Code}

Display description of DB2 internal Return Codes of ZRC hexadecimal return codes.

```
db2diag -rc 0x80020038

  Input ZRC string '0x80020038' parsed as 0x80020038 (-2147352520).

  ZRC value to map: 0x80020038 (-2147352520)
    V7 Equivalent ZRC value: 0xFFFF8138 (-32456)

  ZRC class :
    SQL Error, User Error,... (Class Index: 0)
  Component:
    SQLB ; buffer pool services (Component Index: 2)
  Reason Code:
    56 (0x0038)

  Identifer:
    SQLB_INVALID_STATE_TRANSITION
  Identifer (without component):
    SQLZ_RC_BADTRAN

  Description:
    Invalid state transition

  Associated information:
    Sqlcode -291
  SQL0291N  State transition not allowed on table space.

    Number of sqlca tokens : 0
    Diaglog message number: 1
```

Interpreting the DB2DIAG.log

SQL0291N State transition not allowed on table space.

But, but … I need more.

Getting a detailed message:

- Knowledge Center
- Command Line Lookup

  db2 ? SQL0291N


```
db2 ? SQL0291N

SQL0291N  State transition not allowed on table space.

Explanation:

An attempt was made to change the state of a table space. Either the new
state is not compatible with the current state of the table space, or an
attempt was made to turn off a particular state and the table space was
not in that state.

User response:

Table space states change when a backup is taken, the load completes,
the rollforward completes, etc., depending on the current state of the
table spaces. Refer to the systems administration guide for further
information about the table space states.

sqlcode: -291

sqlstate: 55039
```

47

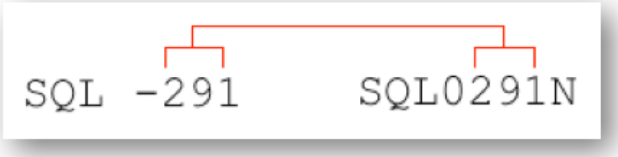
Notice the comment:
"Table Space states change when a backup is taken, the load completes …."

Interpreting the DB2DIAG.log

```
Associated information:  Sqlcode -291
SQL0291N  State transition not allowed on table space.
```

Quick Tip:

When you don't have a SQL Error Code (like SQL0291N) that you can look up, extrapolate the code from a negative SQL Code.



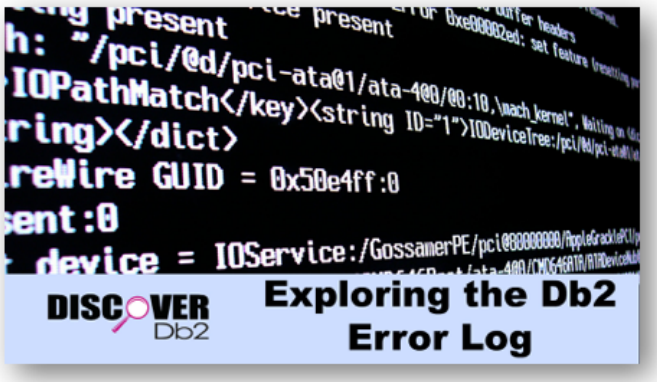
48

In the end, what happened?

```
2017-02-17-03.21.26.211568-360 I6313E630             LEVEL: Severe
PID     : 11640                TID : 140265222301440 PROC : db2sysc 0
INSTANCE: db2inst1             NODE : 000            DB   : DBNAME
APPHDL  : 0-19101              APPID: 00.000.00.0.59488.170217092058
AUTHID  : OMSUSR               HOSTNAME: devbox.mhsl01.mhsl.local
EDUID   : 729                  EDUNAME: db2agent (DBNAME) 0
FUNCTION: DB2 UDB, buffer pool services, sqlbStateGetCheck, probe:633
DATA #1 : String, 22 bytes
Current pool state is:
DATA #2 : Pool State, PD_TYPE_SQLB_POOL_STATE, 4 bytes
0x00000800
      - SQLB_BACKUP_IN_PROGRESS
```

In this specific case, two more error messages proceeded after the “Invalid State Transition”

1. Backup is in Progress
2. An Error with a REORG Statement



www.youtube.com/DiscoverDB2

DISCOVER.DB2
Published on May 1, 2018

The error log can be intimidating. Sometimes the error log seems to have too much information to parse, sometimes it doesn't seem to have enough. This episode will cover how to find the error log, how to effectively mine information found inside, and some oddball tips to help you along.

Timestamps:
00:44 - Where is it the error log?
02:16 - What is in the error log?
03:43 - Cool ways to look up error codes
06:35 - Command line walkthrough
09:59 - How to use PD_GET_DIAG_HIST

GitHub Repository:
https://github.com/MKrafick/DiscoverDB2

PARSE_DIAG.ksh
A quick script that takes a database name and pulls 24 hours of DB2DIAG.log details via PD_GET_DIAG_HIST.

Useful Links:
(Blog) DB2 Error Logging - https://tinyurl.com/ybxgzzs8
(Blog) db2diag tool for Parsing the Diagnostic Log - https://tinyurl.com/7q3pnqu

Category Science & Technology

YouTube Channel: https://www.youtube.com/DiscoverDB2

Quick Evaluation of DB2 Metrics - MONREPORT.DBSUMMARY

Give me ALL THE METRICS!

MONREPORT.DBSUMMARY

Syntax:

```
db2 "call monreport.dbsummary (No. Seconds)"
```

What it does:

Calls table functions, waits X seconds, calls table functions again. Calculate the difference.

Summarizes:

System Performance | Application Performance | Member Info

Quick Evaluation of DB2 Metrics - MONREPORT.DBSUMMARY

```
Buffer pool hit ratios

Type            Ratio           Formula
--------------- --------------- ------------------------------------------------
Data            99              (1-(20+0-0)/(155402+860))
Index           99              (1-(33+0-0)/(205472+3966))
```

```
- I/O wait time is
  (POOL_READ_TIME + POOL_WRITE_TIME + DIRECT_READ_TIME + DIRECT_WRITE_TIME).

        TOTAL_CPU_TIME          TOTAL_      RQSTS_COMPLETED_  I/O
MEMBER  per request             WAIT_TIME %  TOTAL            wait time
------  ----------------------  ----------  ---------------  ----------------
0       135                     1           33191            83
```

Quick Evaluation of DB2 Metrics - MONREPORT.DBSUMMARY

```
Locking
------------------------------------------------------------------------------
                        Per activity                 Total
                        ---------------------------  ----------------------
LOCK_WAIT_TIME          0                            0
LOCK_WAITS              0                            0
LOCK_TIMEOUTS           0                            0
DEADLOCKS               0                            0
LOCK_ESCALS             0                            0
```

```
Row processing
  ROWS_READ/ROWS_RETURNED       = 10 (880348/86471)
  ROWS_MODIFIED                 = 27434
```

53

VM, Cloud Computing, Noisy Neighbors and Server Level Metrics

One application uses the majority of resources negatively affecting a second application.

- Virtual Servers, or LPAR's (Logical Partitions), where you have shared resources.
- Can complicate or mask root cause analysis

Although any of the main resources can be affected, in my experience it makes disk metrics suspect.

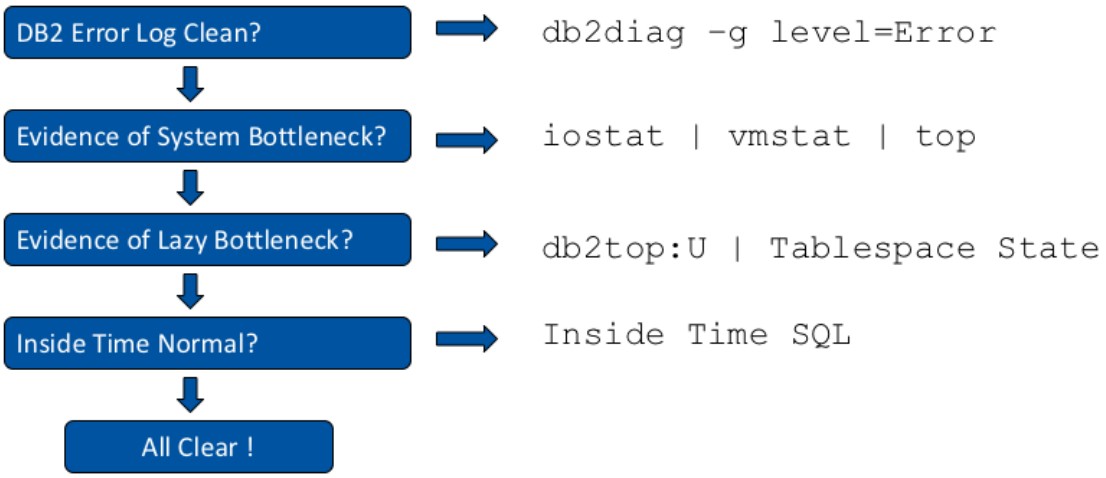
- I/O Per Second (IOPS)
- Disk Queue Length
- Reads/Writes; Random/Sequential
- I/O Section of MONREPORT.DBSUMMARY

Be wary when storage team touts load balancing, hotspot management, cache, etc.

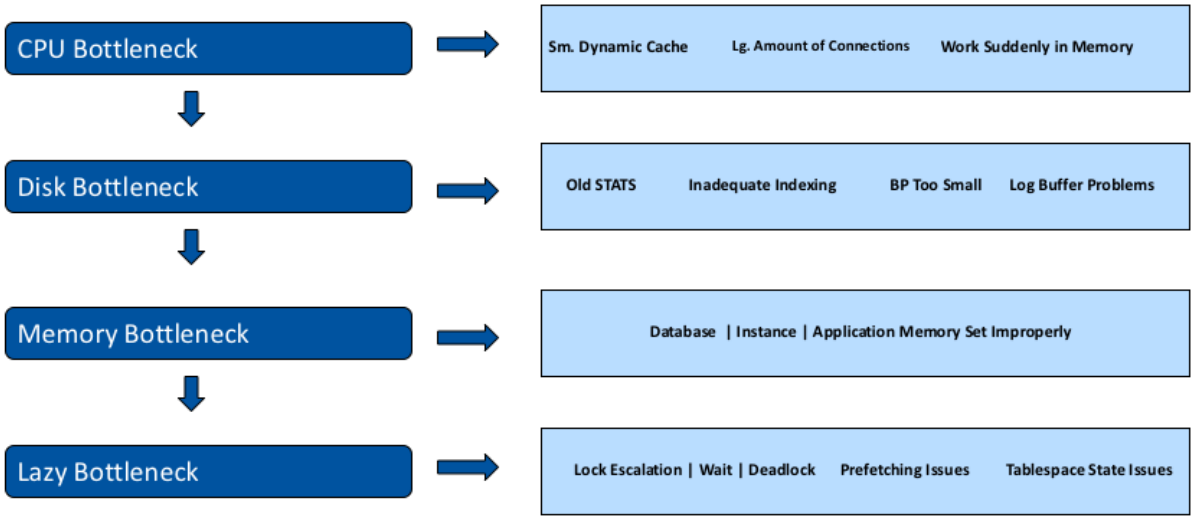
Assessing the Problem

"Well, there's your problem!" – Adam Savage

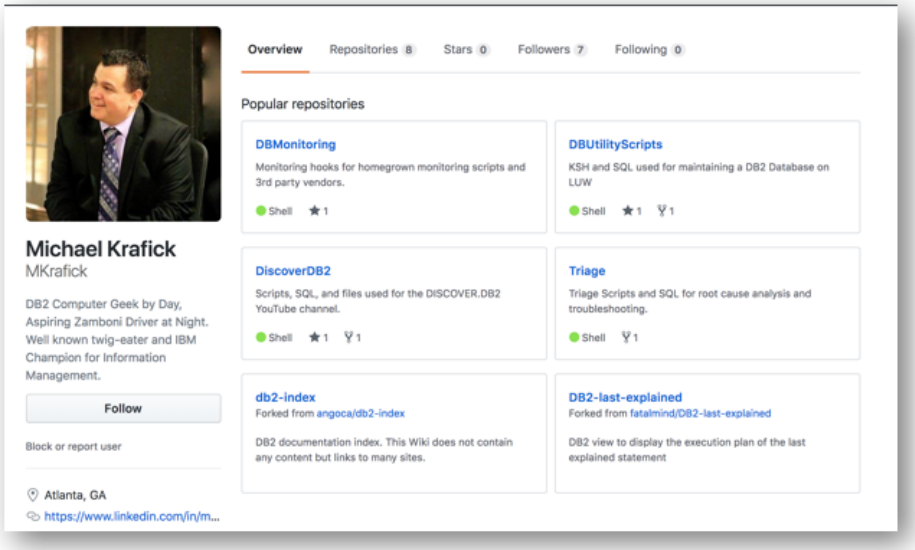
"All Clear" or "Captain, we have a problem"?



"We Have a Problem"

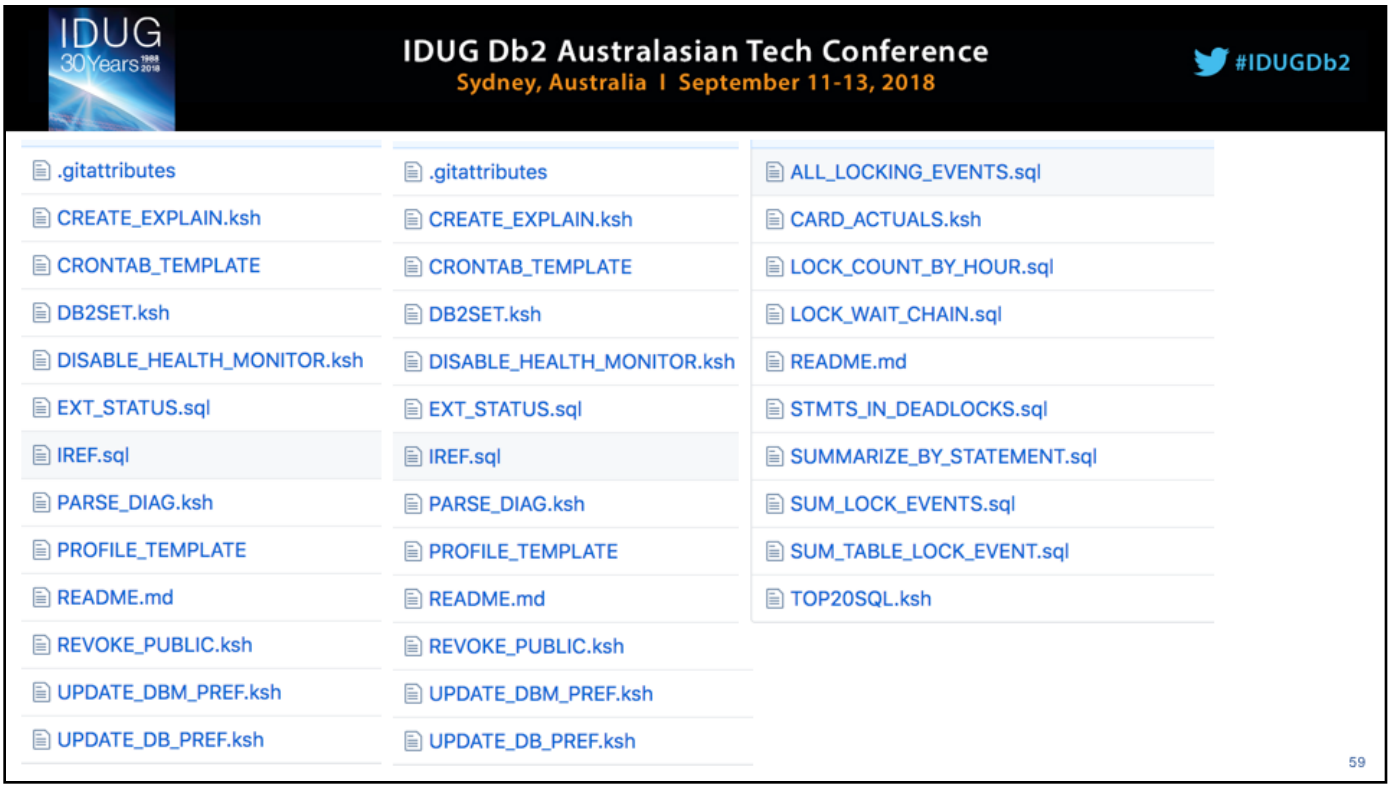


Resources



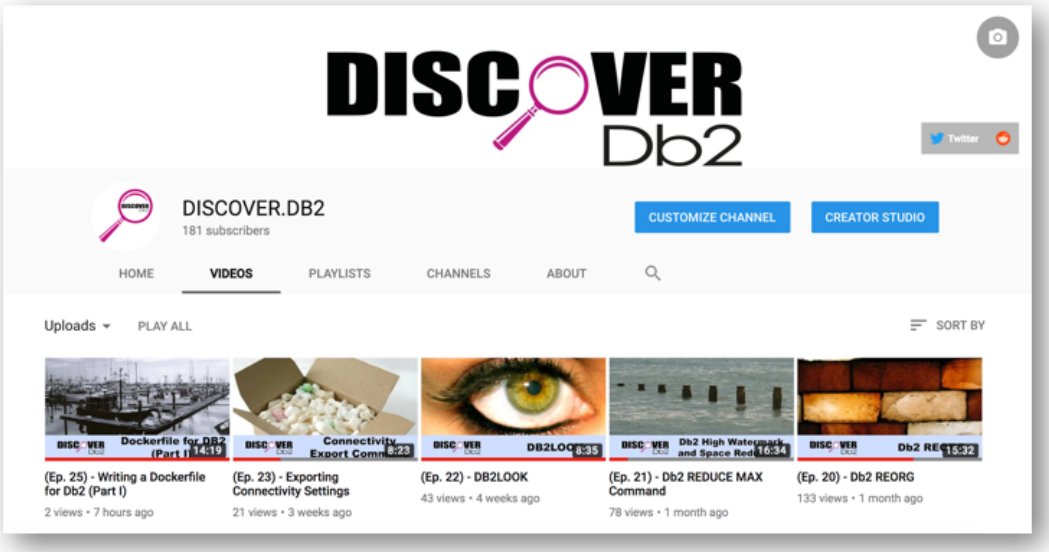
58

Krafick's Github - https://github.com/Mkrafick



Krafick's Github - https://github.com/Mkrafick

Resources


DISCOVER Db2
Twitter
DISCOVER.DB2
181 subscribers
CUSTOMIZE CHANNEL
CREATOR STUDIO
HOME
VIDEOS
PLAYLISTS
CHANNELS
ABOUT
Uploads
PLAY ALL
SORT BY
(Ep. 25) - Writing a Dockerfile for Db2 (Part I)
2 views • 7 hours ago
(Ep. 23) - Exporting Connectivity Settings
21 views • 3 weeks ago
(Ep. 22) - DB2LOOK
43 views • 4 weeks ago
(Ep. 21) - Db2 REDUCE MAX Command
78 views • 1 month ago
(Ep. 20) - Db2 REORG
133 views • 1 month ago

IDUG 30 Years 1988 2018

IDUG Db2 Australasian Tech Conference

Sydney, Australia I September 11-13, 2018

#IDUGDb2

10 Minute Triage: Troubleshooting Production Issues 101

Michael Krafick (Twitter: @mkrafick)

Lead Db2 Database Engineer, Atlanta

Session Code: H6

Thursday, September 13, 2018 (9:45 am) | Platform: LUW